THE

ONTARIO WATER RESOURCES

COMMISSION

REPORT ON

WATER POLLUTION

in the

TOWNSHIP OF TECK

1963

REPORT

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1963

P.G.Cockburn, P.Eng.,
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Division of Sanitary Engineering

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A - ENCLOSED IN POCKET LOCATED INSIDE BACK COVER.

SUMMARY & RECOMMENDATIONS

SUMMARY

In October 1963, a surface water pollution survey of the Blanche River system was conducted in the Township of Teck. The purpose of the investigation was to provide updated information related to the pollution of the Blanche River. A previous investigation was undertaken by the Sanitary Engineering Division of the OWRC in 1958.

The sewage treatment works serving the communities of Kirkland Lake, Swastika, and Chaput-Hughes were investigated with particular reference being made to the associated effect on the surface water by the discharge of the effluents from these treatment units. A total of eleven sedimentation tanks are utilized to treat the sewage from the communities. None of the units is considered to provide a satisfactory degree of treatment.

In conjunction with the survey, a meeting was held with the Township Council. The council was not favourably responsive to the proposal that additional sewage works are necessary for the Kirkland Lake area of the township. The basic argument opposing such works is the fact that there is a minimal population in the areas through which the polluted watercourses flow. However, severe pollution is regularly occurring in the watercourses and in keeping with the objectives and purposes of the Ontario Water Resources Commission, remedial measures are in order.

Varying degrees of pollution were detected in the Blanche River and Murdock Creek which is the most significant tributary in the community. In three instances, within the area under consideration, the bacteriological examination of the water indicated coliform concentrations in excess of twenty-four million organisms per 100 ml. Further, in one section of Murdock Creek the organic content of the water was 10 to 26 times the established objective for surface water.

Previous reports have suggested that either sewage lagoons or an activated sludge treatment plant might be constructed as a means of providing more adequate treatment of the municipal sewage.

Considering the uncertain state of the municipality with respect to future population and industry, it is suggested that a primary sewage treatment plant could be constructed at the present time. When the future status of the municipality becomes more definite the plant could be enlarged, if necessary, to provide conventional activated sludge treatment.

RECOMMENDATIONS

More adequate sewage treatment works should be provided for Kirkland Lake area of the Township of Teck and consequently consideration should be given to one of the following methods of treatment:

1. Sewage lagoons
2. Activated sludge plant
3. Primary treatment plant with provision for potential enlargement at a later date to an activated sludge plant.

All of which is respectfully submitted,

District Engineer: _____
P.G.Cockburn, P.Eng.

Approved by: _____
K.H.Sharpe, Director

INTRODUCTION

In October 1963, a water pollution survey was conducted by the Sanitary Engineering Division of the Ontario Water Resources Commission of sections of the Blanche River system located within the Township of Teck. The survey was centered around the community of Kirkland Lake. The sewage treatment works serving the communities of Chaput-Hughes and Swastika, and the associated effects on the surface waters by the discharge of the treatment unit effluents were also investigated.

On October 8th, a meeting, related to the provision of more adequate municipal treatment facilities was held with the Township Council, the Township Engineer, and the Medical Officer of Health.

The field work associated with this investigation was made in company with Mr.W.Beckett, C.S.I.(C), Public Health Inspector, Timiskaming Health Unit. Discussions relative to the subject under consideration in this report were held with Dr.E.R.Harris, DPH, Medical Officer of Health, and Mr.L.J.Sherratt, P.Eng., Township Engineer. The co-operation received from these persons was very much appreciated.

THE ONTARIO WATER RESOURCES COMMISSION

Water resources must be conserved against the ravages of pollution from sewage, industrial wastes, and other substances which may impair water quality and interfere with repeated use. The relationship between water supply and pollution is made clear by the overall objectives of the Ontario Water Resources Commission.

By 1955, the need for water supply and sewage treatment works was sufficiently urgent to call for action at the Provincial level. Adequate water resources of good quality were recognized as a primary need for ensuring the continued growth and the welfare of the Province. The inter-relationship of waste disposal and availability of water supplies was conceded in the programme which was adopted by the Province.

The adverse conditions which might develop in relationship to water resources were foreseen by the Ontario Government and in 1955 a Water Resources and Supply Committee was appointed to inquire into and advise on a constructive programme. This committee's report was subsequently followed up by The Ontario Water Resources Commission Act in 1957.

The broad scope of the authority given to the Commission is set out in Section 16, which reads as follows:

"Notwithstanding any other Act, it is the function of the Commission and it has power,

(a) to control and regulate the collection, production, treatment, storage, transmission, distribution and use of water for public purposes and to make orders with respect thereto;

(b) to construct, acquire, provide, operate and maintain, water works and to develop and make available supplies of water to municipalities and persons;

(c) to construct, acquire, provide, operate and maintain sewage works and to receive, treat and dispose of sewage delivered by municipalities and persons;

(d) to make agreements with any one or more municipalities or persons with respect to a supply of water or the reception, treatment and disposal of sewage;

(e) to conduct research programmes and to prepare statistics for its purposes; and

(ea) to disseminate information and advice with respect to the collection, production, transmission, treatment, storage, supply and distribution of water or sewage, and to charge fees in respect thereof;

(f) to perform such other functions or discharge such other duties as may be assigned to it from time to time by the Lieutenant-Governor in Council.

Thus, the object in forming the OWRC was to help municipalities meet their demands for water and sewage works and consequently the Commission offers financial advantages as well as technical assistance in planning, construction and operation of the works.

As indicated, one of the most important functions of the OWRC is the duty or obligation to ensure that each municipality, industry, or individual has an acceptable means of treating and/or disposing of sewage and industrial wastes so that the receiving streams will not become polluted. This programme of pollution abatement is closely aligned to the objective of every individual, that is, to provide an environment which will promote and produce the best living conditions for all.

The implementation of programmes which are primarily related to the safeguarding of the health of the citizens at large requires the co-operation and support of all individuals as well as municipal and provincial authorities.

The major objectives of the Ontario Water Resources Commission are basically twofold. One is to ensure maintenance of public water supplies and to ensure that proper treatment of sanitary and industrial waste is provided prior to discharge of such into streams or lakes.

The second objective is to make it possible for municipalities to finance efficient water and sewage works. For reference purposes, pertinent details of this latter phase of the OWRC's programme will be covered at a later point in this report.

The Division of Sanitary Engineering investigates all cases of pollution as they become known, either through receipt of a complaint or through investigations performed on routine bases. When pollution is established and the offenders located, the OWRC suggests the remedial action required. If there is no other means to rectify the pollution, the OWRC does have the Legislative right to resort to the courts. Section 27, Subsection 1 of The Ontario Water Resources Commission Act states:

> "EVERY MUNICIPALITY OR PERSON THAT DISCHARGES OR DEPOSITS OR CAUSES OR PERMITS THE DISCHARGE OR DEPOSIT OF ANY MATERIAL OF ANY KIND INTO OR IN ANY WELL, LAKE, RIVER, POND, SPRING, STREAM, RESERVOIR OR OTHER WATER OR WATERCOURSE OR ON ANY SHORE OR BANK THEREOF OR INTO OR IN ANY PLACE THAT MAY IMPAIR THE QUALITY OF THE WATER OF ANY WELL, LAKE, RIVER, POND, SPRING, STREAM, RESERVOIR OR OTHER WATER OR WATERCOURSE IS GUILTY OF AN OFFENCE AND ON SUMMARY CONVICTION IS LIABLE TO A FINE OF NOT MORE THAN $1,000 OR TO IMPRISONMENT FOR A TERM OF NOT MORE THAN ONE YEAR, OR TO BOTH".

The Commission is, of course, anxious to co-operate with any individual, municipality,or industry with a problem and each is given the opportunity to work with the OWRC and other authorities in this respect.

PREVIOUS INVESTIGATIONS

1. OWRC REPORT - 1958

Under date of July 1958, a report entitled Teck Township Municipal Sewage Disposal and Pollution of the Blanche River Watershed was prepared by the staff of the Sanitary Engineering Division of the OWRC. The report was very comprehensive and included detailed information on the adequacy of the eleven municipal septic tanks and the associated effects of the discharge of the effluents from these units on the receiving watercourse(s).

It was noted in that report that improved operational procedures might accomplish a more efficient degree of treatment with the existing septic tank units. However, the maximum treatment which is possible by units providing only sedimentation is not adequate to meet the OWRC objectives for the quality of the effluents from sewage treatment works. In a letter dated October 13, 1959, from the General Manager of this Commission to the Township Clerk, the following was noted:

> ".....THESE TANKS HAVE BEEN INSTALLED OVER A NUMBER OF YEARS AS THE AREA DEVELOPED. THE ARRANGEMENT IS NOT A GOOD ONE, AND IT WOULD HAVE BEEN BETTER HAD CONDITIONS AT THE TIME MADE IT POSSIBLE TO BUILD A TRUNK SEWER AND ONE SINGLE PLANT AT A SUITABLE LOCATION. IT DOES APPEAR THAT THIS WILL BE THE SOLUTION FOR THE FUTURE.....".

It is significant to note that this letter clearly indicated to the municipality that the existing method of treating the sewage was not adequate and improvements in this respect were necessary. The Township Engineer subsequently prepared a preliminary engineering report on sewage works.

2. MUNICIPAL ENGINEERING REPORT - 1962

Under date of August 1, 1962, a report entitled A Report on Sewage Disposal for the Town of Kirkland Lake was prepared by the Works Department of the Township of Teck. The preparation of this report was suggested by the OWRC and the following considerations with respect to future sewage works were included:

(i) Two possible areas appeared satisfactory for the construction of sewage lagoons.

(ii) The possibility of constructing a conventional activated sludge treatment plant.

A summary of the three proposed schemes is provided below for reference purposes:

Scheme 1: This proposal suggested a sewage lagoon with a surface area of approximately 170 acres to be located north-west of the community in the Kirkland Slimes Basin. Two raw sewage pumping stations would be required. The first to lift the sewage from the southern part of the community and transport it through a tunnel located beneath Kirkland Lake to a second lift station which would also receive the sewage flow from the central and northern portion of the built-up section. The combined flow would be pumped to the lagoon area.

The total construction cost was estimated at $310,000.

Scheme 2: This scheme utilizes the same collection and pumping arrangements as described for Scheme 1. However, subsequent to the second pumping station, the sewage is conducted to lagoons which would be located in the Wright Hargreaves Slime Basin. The lagoon area was specified at 60 acres. However, it was considered that the odours associated with spring break-up would not create any problem because the suggested site is approximately one mile from the nearest habitation. If the smaller area was not acceptable it was noted that additional acreage could be obtained in either the Kirkland Slimes area or Gami Lake. Either of these sites would then be utilized in series with the initial 60 acres.

The total construction cost was estimated at $400,000.

Scheme 3: This proposal was suggested as an alternative method of treatment to Schemes 1 and 2. A conventional activated sludge plant could be located on Murdock Creek south of the area zoned for Industrial Development. It was uncertain whether or not a pumping station or forcemain would be required and the several other aspects would necessitate further engineering study. Further, the soil at the suggested site may create expensive foundation problems or indirectly add to the cost if this plant had to be located in an area with more suitable soil.

The total construction cost was estimated at $1,025,000.

OBJECTIVES FOR WATER QUALITY CONTROL IN ONTARIO

Certain objectives have been adopted by the Ontario Water Resources Commission for all waters in the Province of Ontario.

In general, it can be stated that all wastes, including sanitary sewage, storm water, and industrial effluents shall be in such condition when discharged into any receiving waters that they will not create conditions which will adversely affect the waters.

Adverse conditions may be caused by:

(a) Excessive bacterial, physical or chemical contamination.

(b) Unnatural deposits in the stream, interfering with navigation, fish and wildlife, bathing, recreation or destruction of aesthetic values.

(c) Toxic substances and materials imparting objectionable tastes and odours to waters used for domestic or industrial purposes.

(d) Floating materials, including oils, grease, garbage, sewage solids, or other refuse.

(e) Discharges causing abnormal temperature, colour or other changes.

In the Township of Teck, the major pollution is caused by bacterial and organic chemical contaminants, primarily sanitary sewage.

EXPLANATION & SIGNIFICANCE OF LABORATORY ANALYSES

The sanitary chemical analyses reported here were performed at the Ontario Water Resources Commission laboratory in Toronto and the bacteriological examinations were made at the Department of Health Regional Laboratory in Timmins.

SIGNIFICANCE

The most common analyses of sanitary significance are: Biochemical Oxygen Demand, Suspended Solids, and the bacteriological determination expressed as either Total Coliforms per 100 ml or E.coli per 100 ml.

Biochemical Oxygen Demand(BOD): The BOD is reported in ppm and is an indication of the amount of oxygen required for the stabilization of decomposable organic matter present in sewage, polluted waters, or industrial wastes. Consequently, the Biochemical Oxygen Demand present in the waste water discharge reduces and may eliminate the dissolved oxygen content of the receiving stream.

Laboratory tests are conducted over a period of controlled incubation. The time and temperature commonly used for the test are five days at 20°C. These conditions were utilized for all of the BOD determinations included in this report.

The desirable upper limit in natural water is 4 ppm.

Solids: The analyses for solids usually include tests for total, suspended, and dissolved solids. Suspended solids indicate the measure of undissolved solids of organic or inorganic nature. Land erosion, sewage, and industrial wastes are significant sources of suspended solids.

The effect of suspended solids in water is reflected in difficulties associated with water purification, deposition in streams, and possible injury to the habitat of fish.

The OWRC objective for the suspended solids in the effluents from sewage treatment plants is not greater than 15 ppm.

Where suspended solids approach 20 ppm or less, laboratory difficulties are experienced and, excepting the samples from sewage treatment works, the values of suspended matter are usually determined as turbidity.

Turbidity: Turbidity is an optical measure of the fine suspended solids, such as silt and finely divided organic matter, in water. Where suspended solids approach 20 ppm or less, the results are usually reported as turbidity in Silica Units.

Bacteriological Examination: Bacteriological examinations were performed on samples from streams and the outfalls from sewage treatment works. The examinations carried out indicate both the total concentration of coliform organisms and the number of these which are of a special genus - Escherichia coli(E.coli).

Coliform organisms are normal inhabitants of the intestines of man and other warm-blooded animals. They are always present in large numbers in sewage and are generally minimal in other stream pollutants.

The tests were performed by the multiple tube method and are recorded as the most probable number(MPN). This is a statistical determination of the most probable number of coliform bacteria in 100 millilitres of sample.

A coliform density of less than 2400 organisms per 100 ml is desirable in surface waters.

OWRC INVESTIGATION - 1963

General Discussion

The purpose of the investigation and this report is to provide updated information related to municipal sewage works in the township and the associated effects on the Blanche River and the pertinent tributaries.

The need for improved sewage treatment facilities to serve this municipality is evident. However, this report has been prepared to point out this need both to the Township Council and indirectly to the residents of Kirkland Lake, Swastika, and Chaput-Hughes.

The sampling was carried out on October 8 and 9, 1963, to determine the effect of the discharges of inadequately treated sewage from the communities of Kirkland Lake, Swastika and Chaput-Hughes, on the Blanche River and its tributaries, specifically Murdock Creek.

Within the Township of Teck, three unorganized communities namely Kirkland Lake, Swastika, and Chaput-Hughes provide treatment for sanitary sewage in eleven septic tanks located at various points in the municipality. Seven of the units serve Kirkland Lake and all of these subsequently discharge to Murdock Creek.

Meeting with Council

On October 8, 1963, a meeting was attended related to present and future sewage works for the community of Kirkland Lake and the associated effects on the Blanche River and Murdock Creek. Those in attendance were:

Township of Teck

Mr.G.McCrank, Reeve
Mr.A.Sandarin, Councillor
Mr.F.Rainfort, Councillor
Mr.S.Johnston, Councillor
Mr.R.McBean, Councillor
Mr.J.W.McBain, Clerk-Controller

Mr.L.J.Sherratt, P.Eng., Township Engineer

Timiskaming Health Unit

Dr.E.R.Harris, DPH, Medical Officer of Health

Ontario Water Resources Commission

Messrs.C.E.McIntyre, K.Reichert, P.G.Cockburn

In general, the council was not favourably responsive to the proposal that additional sewage works are necessary for the Kirkland Lake area of the township. The basic argument opposing such works is the fact that there is a minimal population in the area through which both Murdock Creek and the pertinent section of the Blanche River flow. It is noted that this is the case in many municipalities in the northern part of the Province and in numerous instances in the southern counties. However, the need for improved facilities can not be discounted for this reason. Severe pollution is regularly occurring in the watercourses here and in

keeping with the objectives and purposes of the Ontario Water Resources Commission, as specified in The Ontario Water Resources Commission Act, remedial measures are in order.

The potential problems with respect to future financing of public works in this municipality, as well as several others in the district, does present a distinct cause for concern to the public officials. However, although the number of mining operations is diminishing it will probably be several years until the overall economic significance associated with this is realized. Further, it is possible that more diversified operations may become more common. For example, an open-pit iron mining operation is presently being developed in adjacent Township of Boston.

If municipal expenditures are kept to a minimum on the basis of an uncertain future, the pollution of the watercourses conceivably might continue indefinitely. Conversely, the council is commended for the interest they are taking in the future status of the municipality. However, it is noted that the Ontario Municipal Board supervise the finances of all municipalities in the Province and consequently this financial control will govern any possible expenditure for public works by the Township of Teck.

Stream Pollution

Varying degrees of pollution were detected in the Blanche River and Murdock Creek. Samples were obtained at appropriate locations for bacteriological examination and sanitary chemical analyses. The results of these tests are summarized in Table I.

In view of the stream quality objectives as previously stated, it is noted that the watercourses in the vicinity of the community of Kirkland Lake are being seriously polluted by the discharge of inadequately treated sanitary wastes. In three instances, within the community, the bacteriological examination of the water indicated coliform concentrations in excess of twenty-four million organisms per 100 millilitres.

Further, between Rand Avenue North and Main Street, the organic content of Murdock Creek as determined by the Biochemical Oxygen Demand of the water, is between 45 parts per million and 105 parts per million. These values are 10 to 26 times greater than the established objective for surface waters.

The effect of this pollution can be detected downstream as far as Round Lake, a distance of approximately 10 miles.

Existing Sewage Treatment Works

The operation and treatment efficiency of the existing septic tank units is given minimal coverage. It is an established fact that units such as these do not provide the degree of treatment

necessary to safeguard the waters of the rivers and streams into which the effluent is discharged.

No attempt was made at this time to determine the actual efficiency of the existing sewage treatment facilities provided for the communities of Kirkland Lake, Chaput-Hughes, and Swastika. The eleven septic tanks and pertinent trunk and outfall sewers are shown on the plan which accompanies this report.

The physical aspects of these units have been included in previous reports by this Commission, and for reference purposes a summarized tabulation of pertinent information is given in Table II.

None of the tanks can be considered as providing a satisfactory degree of sewage treatment. This statement is confirmed by the results of bacteriological examinations and sanitary chemical analyses performed on effluents from the units which are given in Table III.

Sedimentation is a very important requirement for the complete treatment of sewage. However, it is only one of several processes required. Physical limitations are imposed on all sedimentation units and regardless of how adequate the units are, by themselves they are not capable of effecting a satisfactory degree of sewage treatment. Under ideal conditions with respect to the strength of the raw sewage and the hydraulic load imposed, sedimentation can only effect 35 per cent removal

of the Biochemical Oxygen Demand and 60 per cent removal of the suspended solids. The bacterial content of the sewage being treated is not significantly altered by the sedimentation process.

A review of the results of laboratory tests as given in Table III, indicates the very high bacterial content, BOD, and suspended solids in the effluents from all eleven septic tanks.

FUTURE SEWAGE WORKS

As previously noted, the 1962 report on sewage works by the Works Department suggested two possible sites for sewage lagoons. These are indicated on the appended plan.

Scheme 1 suggests a lagoon area of approximately 170 acres to be located in the Kirkland Lake Slimes Basin.

Scheme 2 is a proposal for a lagoon approximately 60 acres in size located in the Wright Hargreaves Slimes Basin. This is much less than the area required using the standard design criteria of one acre per 100 persons. However, it was noted in the report that a buffer area between the site and habitation of approximately one mile in width would be provided and consequently if anaerobic conditions did occur, the effect on the built-up area would be non-existent or at least minimal.

A third possibility would be the construction of a primary sewage treatment plant at the present time. When the population and future status of the municipality becomes more definite the primary plant could be enlarged, if necessary, to a conventional activated sludge plant.

A primary treatment plant would probably be adequate for several years before any alteration and/or extension need be considered. A primary sewage treatment plant would be comprised of:

Preliminary units	--	comminution and/or screening grit removal
Sedimentation	--	mechanically cleaned clarifier(s)
Digestion	--	digestion of sludge (and skimmings)from clarifier(one or two stages)
Sludge Disposal	--	
Chlorination	--	chlorination of the final effluent during the period of April 1-November 1

For clarification of these treatment units, reference should be made to the two illustrations of treatment plants which are appended to the report. By comparing these two diagrams it can be seen how the primary sewage treatment plant can be extended and modified to provide a conventional activated sludge plant.

CONSTRUCTION PROCEDURES UNDER THE OWRC

GENERAL

Any municipality is free to decide whether it wishes to undertake its own work or to place it under the Commission. The Commission is primarily interested in aiding municipalities to obtain adequate sewage treatment works. The following is included

as a general guide to the procedure to be followed in the event that the township wishes to undertake any future sewage works as a project of the Ontario Water Resources Commission. Much of the information included here, is also appended to the report in summarized form.

It should be noted that after the municipality indicates a desire to proceed, the staff of the OWRC, particularly the Project Control Branch, will provide continual guidance to the municipality with respect to what is required of them. Further, if a consulting engineer is retained, he will also deal with certain aspects of the programme on behalf of the municipality. The discussion included here, is intended only as a general outline of the overall programme.

CENTRAL MORTGAGE & HOUSING CORPORATION

In December 1960, the Federal Government made it possible for Central Mortgage and Housing Corporation to loan up to two-thirds of the costs of sewage treatment plants and certain trunk sewers, and to forgive 25 per cent of this loan if the work is completed by March 31, 1965. The authority for this work is given under the National Housing Act, Part VIB.

The OWRC is prepared to consider the financing of the remaining one-third, and other work which is not includedwithin the scope of the N.H.A.

It should be noted that the municipality, or their consulting engineer, deals directly with CMHC whether the remainder of the work is under the OWRC or financed directly by the municipality.

PRELIMINARY REPORT

It is necessary that an estimate of the cost of the project is available to council before a decision to proceed can be made. Consequently, the preparation of a preliminary engineering report which includes itemized cost estimates together with general details of the work is required as an initial step.

It has been noted that a preliminary engineering report was prepared in 1962 by the Township Engineer and the Works Department of the municipality. It is possible that the report may require some up-dating, but basically it should be adequate if a lagoon system or an activated sludge plant is considered. However, if council decides to proceed initially with a primary sewage treatment plant, it will be necessary to obtain an additional preliminary engineering report on this proposal.

Such a report could be prepared by either the municipal engineer or a consulting engineer. The decision in this respect rests with council.

When this preliminary agreement has been approved and signed by both the municipality and the Commission, the latter proceeds to have the necessary plans, specifications, and cost estimates prepared. The policy of the Commission has been to appoint consulting engineers to do the design work and also to provide field supervision during construction. Thus, the consulting engineer is an agent of the Commission rather than the municipality.

The cost estimates and the design as prepared by the engineer are then approved by the OWRC. This approval is required by CMHC in the application for the loan and the municipality then submits a formal application to CMHC. The details with respect to this application are given in publication 1333 issued by CMHC.

The Commission will call for tenders and if the tendered price is acceptable to the municipality and the Commission, a final agreement is signed by both parties. The OWRC seeks the final approval of the OMB. If the bids are not acceptable, the work will not proceed and the municipality will be held responsible by its preliminary agreement for costs to that date.

Following the final approvals of the OMB and CMHC the contracts are entered into and the work commences.

All contracts for the project are awarded by the OWRC and the complete project is under the direct supervision of the Commission. In this respect, the Commission maintains a Construction Division to ensure that the project is carried out to its satisfaction.

Payments are made to the contactor as the work progresses, also to the suppliers of equipment and to the consulting engineer. In this way, no payments are made by the municipality until the works are actually in operation.

The final agreement between a municipality and the Commission is based upon the latter assuming responsibility for the operation and maintenance of the works during the life-time of the debt. When the project is constructed, the responsibility for these works passes from the Construction Division of the Commission to the Plant Operations Division.

The personnel involved in the actual operation of the work are engaged by and paid by the Commission. For small works that do not require the services of a full-time staff, arrangements may be made to employ on a part-time basis some of the local employees of the municipality, or others as the case may be.

The agreement between the municipality and the Commission also contains a clause whereby at the termination of the debt, the works may be turned over to the municipality at the request of either party.

An important part of this entire programme is the means for co-operation between the Commission and the municipality served. Each municipality is asked to appoint a local advisory committee to work with the Commission and to deal with all aspects of the programme. In this way, there is a local direction for such matters as appointment of employees, wages paid, and many other features of administration.

The Commission offers to each municipality extensive services in the operation of the works. There is co-ordination of technical matters in which the advice of local personnel is combined with the specialized training of the Commission's personnel. In many municipalities where there has been little local experience on such matters, the Commission advises on all aspects of administration, including rate structures, bookkeeping, records, etc. In this way, full use is accorded each municipality of the Commission's laboratory facilities and its technical staff without cost to the community.

FINANCING OF COMMISSION PROJECTS

When projects are financed by the Commission, the municipality does not issue or sell any debentures or bonds. Money is advanced by the OWRC and the debt is paid back over a period of up to a maximum of 30 years. The interest rate is the Province's actual rate of borrowing and this rate is normally lower than it is possible for the municipality to obtain on the open market.

All financial obligations to be incurred by municipalities come under the supervision of the Ontario Municipal Board. This Board determines whether the obligation is within the financial ability of the municipality. The same requirement applies whether the municipality is financing the work by debenture issue or when the work is a project of the Commission. In the latter instance, the Commission deals directly with the Board for the municipality.

Annual Charges

The annual charges to the municipality is normally determined by four items:

1. Interest on Principal
2. Debt Retirement
3. Reserve fund to provide for contingencies, etc.
4. Operating costs

Sewer Rates

A sewer rate may be imposed to meet the portion of the capital costs as the bylaw specifies re interest and debt retirement. It may be a combination of the following:

(i) a foot frontage rate
(ii) a surcharge on water bill
(iii) general mill rate

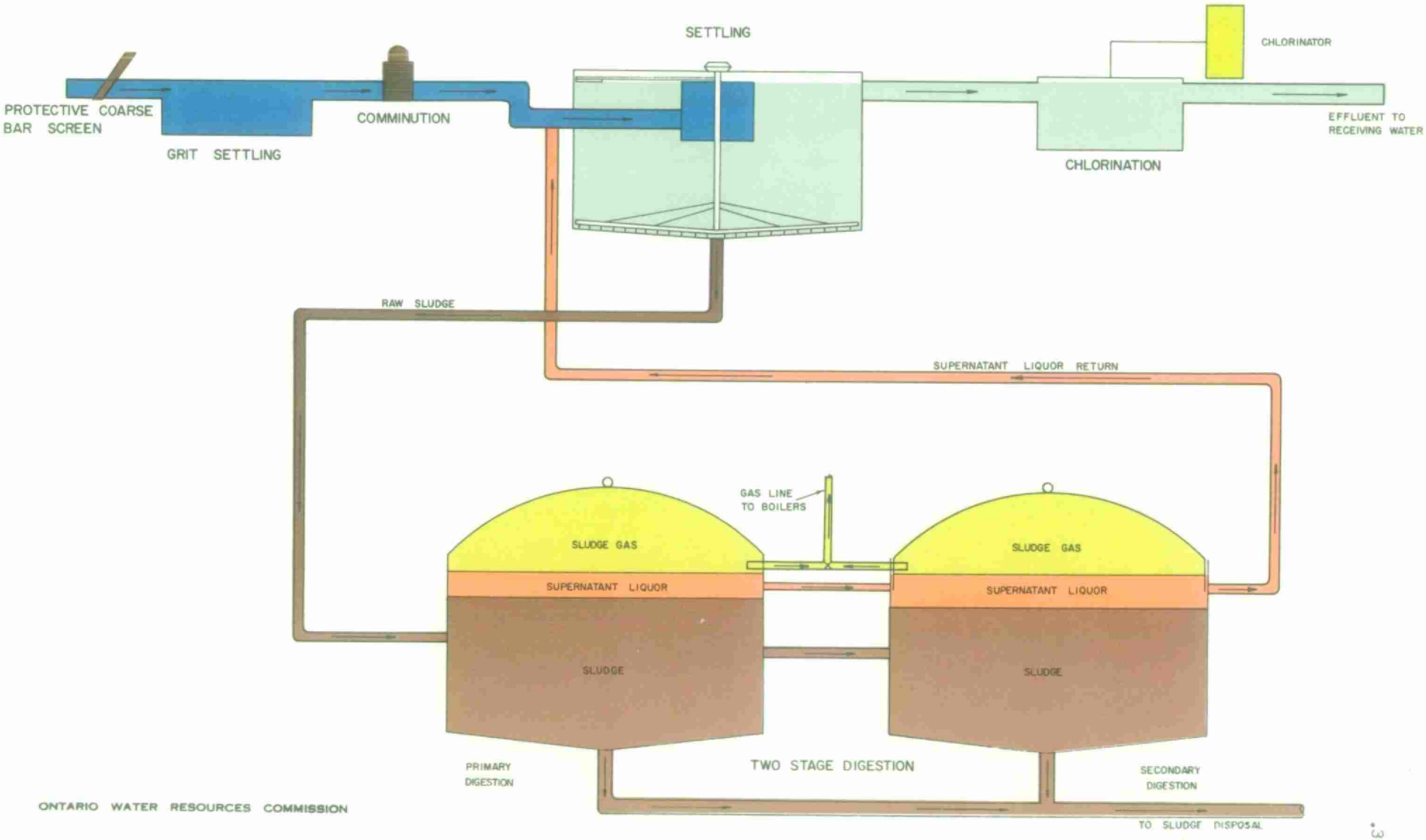
Sewer Service Rates

The sewer service rates are imposed to meet the annual cost of maintenance and operation of the works. The following may be used:

(i) surcharge on water bill
(ii) flat rate charge
(iii) mill rate on actual users

A P P E N D I X

PRIMARY SEWAGE TREATMENT



ONTARIO WATER RESOURCES COMMISSION

TABLE I

WATER POLLUTION - TOWNSHIP OF TECK

Blanche River Watershed

Sample Point Designation	Description	Bacteriological Examination Total Coliforms (MPN/100ml.)	E.coli (MPN/100ml.)	Sanitary Chemical Analysis BOD (ppm)	Suspended Solids (ppm)
OB 570.2	Round Lake Beach (Rosegrove)	2,400	0	0.6	3.1*
	Blanche River				
OB 570.7	Blanche River at road west of Rosegrove Beach)	11,000	240	2.1	6.0*
OB 575.2	Blanche River at sideroad	24,000	93	3.3	2.9*
OB 578.9	Blanche River upstream from Otto Lake	240,000	2,400	0.9	3.8*
OB 580.2	Blanche River upstream from Swastika(at water works)	30	--	2	5
	Amikougami Creek				
OBA 580.8	Amikougami Creek at Hwy.66	93	0	0.6	6.0*
	Murdock Creek				
OBU 578.7	Murdock Creek at Hwy.112	460,000	0	1.3	2
OBU 581.7	Murdock Creek downstream from Kirkland Lake and from septic tank No.6	24,000,000+	2,400	55	64

Table I (con't)

Sample Point Designation	Description	Bacteriological Examination Total Coliforms (MPN/100ml.)	E.coli (MPN/100ml.)	Sanitary Chemical Analysis BOD (ppm)	Suspended Solids (ppm)
OBU 581.87	Murdock Cr.downstream from "tunnel" sewer outfall	24,000,000+	24,000	45	93
OBU 581.92	Murdock Cr. at point of discharge from "tunnel" sewer	24,000,000+	24,000,000	50	76
OBU 582.1	Murdock Cr. at Rand Ave. W.(Rand St. sewer outfall)	240,000	24,000	105	80
OBU 582.21	Murdock Cr.downstream from septic tank No.1	460,000	240	NCS	NCS
OBU 582.27	Murdock Cr.upstream from septic tank No.1	11,000	43	NCS	NCS
OBU 583.14	Murdock Cr. near water works	110,000	0	0.8	1.4
	Rand Creek				
OBUR 581.97	Rand Cr. above confluence with Murdock Cr.	15,000	23	NCS	NCS

NOTE: * Results determined is turbidity in silica units

NCS No sample obtained for sanitary chemical analysis

Samples taken by: C.E.McIntyre, P.Eng.; W.Beckett, C.S.I.(C); P.G.Cockburn, P.Eng.
Date Sampled: October 8 & 9, 1963.

TABLE II

WATER POLLUTION - TOWNSHIP OF TECK

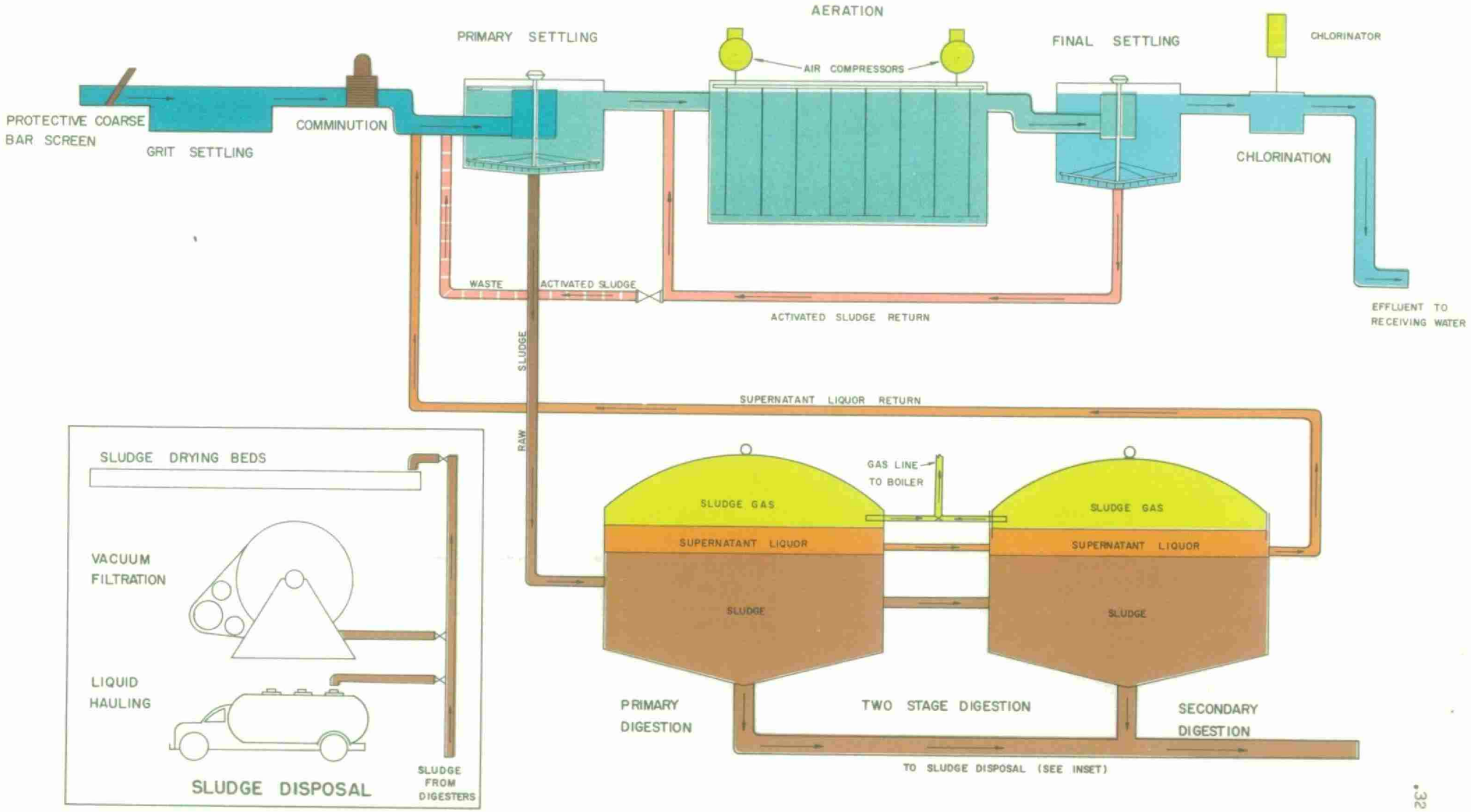
SEPTIC TANK DATA

Tank No.	Location	Description	Outlet	Possible Bypass or Overflow	Remarks
1.	Kirkland L. between Queen St. & Premier Ave.W.	2 equal compartments (158,000 gal.)	27"ϕ sewer to Murdock Cr. at Rand Ave.W. (OBU-581.62)	Yes- (effluent)	Unsatisfactory
2.	Kirkland L.at Carter St. & Balsam Ave.	2 equal compartments (52,500 gal.)	24"ϕ & 27"ϕ sewers to Murdock Cr. at Rand Ave.W.	No	Unsatisfactory
3.	Kirkland L. at Comfort & Prince Sts.	3 equal compartments (175,000 gal.)	Tunnel sewer to Murdock Cr.	No	Unsatisfactory
4.	Kirkland Lake at Water St. & Duncan Ave.	2 compartments (127,000 gal.)	Tunnel sewer to Murdock Cr.	No	Unsatisfactory
5.	Kirkland L. at Brookbank & Carter Aves.	4 equal compartments (2 separate units) (252,000 gal.)	24"ϕ & 27" sewers to Murdock Cr. (sewers also convey flow from creek)	Probably	Unsatisfactory
6.	Kirkland L.- Main St. at Murdock Cr.	2 equal compartments (57,500 gal.)	Directly to Murdock Cr.	--	Unsatisfactory
7.	Kirkland L.- Government Rd.W. & Woods St.	4 compartments (36,100 gal.)	Tunnel sewer to Murdock Cr.	Unknown	Unsatisfactory

SEWAGE TREATMENT

BY THE

ACTIVATED SLUDGE PROCESS



ONTARIO WATER RESOURCES COMMISSION

Table II (con't)

Tank No.	Location	Description	Outlet	Possible Bypass or Overflow	Remarks
8.	Chaput-Hughes at Chaput Ave.	1 compartment (50,000 gal.)	Directly to small creek to Kirkland L.	Yes(at inlet manhole)	Unsatisfactory
9.	Chaput-Hughes at Carrol St. W. of Government Rd.	1 compartment (4,700 gal.)	Directly to creek tributary to Amikougami R.	Yes(at inlet manhole)	Unsatisfactory
10.	Swastika at Riverside St. & Kirkland Ave.	2 compartments	Direct to Blanche R.	Overflow at inlet manhole reportedly blocked	Unsatisfactory
11.	Swastika- CN tracks and Blanche R.	1 compartment	Direct to Blanche R.	Unknown	Unsatisfactory

NOTE: (The capacity of each tank given in parentheses indicates the total capacity at each location. This data was obtained from previous Commission reports).

TABLE III

WATER POLLUTION - TOWNSHIP OF TECK

Septic Tank Effluents

	Bacteriological Examination		Sanitary Chemical Analysis	
	Total Coliforms (MPN/100ml.)	E.coli (MPN/100ml.)	BOD (ppm)	Suspended Solids (ppm)
Septic Tank No.1 (Kirkland Lake)	24,000,000	24,000,000	55	77
2	11,000,000	46,000	90	85
3	24,000,000+	24,000,000+	65	63
4	24,000,000+	24,000,000+	60	85
5	24,000,000+	24,000,000+	130	110
6	24,000,000+	24,000,000+	76	67
7	24,000,000+	24,000,000+	78	77
8 (Chaput-Hughes)	24,000,000+	2,400	45	55
9	24,000	24,000	44	44
10 (Swastika- No.1)	24,000,000+	46,000	60	118
11 (Swastika- No.2)	240,000	24,000	62	30

Sampled by: C.E.McIntyre; W.Beckett; P.G.Cockburn

Date Sampled: October 8 & 9, 1963

SUMMARY OF CONSTRUCTION PROCEDURES

The following is a general summary of the steps with respect to OWRC projects up to the point where construction is initiated:

*1. Council passes a resolution requesting the Commission to undertake the work as described in Preliminary Report.

*2. Application by municipality to Sanitary Engineering Division for preliminary approval.

3. Sanitary Engineering Division issues approval.

4. The OWRC advises council that in principle, project will be undertaken by Commission.

5. Documents necessary for preliminary approval of Ontario Municipal Board are forwarded to council for approval.

*6. Municipality passes the above bylaw and approves of other documents.

*7. Municipality applies to local CMHC office for statement re eligibility of project.

8. CMHC gives opinion as to part of work which is eligible for loan.

9. OWRC applies to OMB for preliminary approval.

10. OMB gives approval for project(it is possible that negative decision may be handed down).

11. OWRC seeks approval of Provincial Cabinet.

*12. Commission and municipality enter into preliminary agreement.

13. Commission enters into agreement with a consulting engineer for design of project.

14. Engineer prepares plans, specifications and cost estimates.

15. OWRC approves estimates and approves the design.

*16. The municipality submits an application to CMHC. Details on what is required in this respect is given in publication 1333 issued by CMHC.

17. OWRC calls for tenders.

18. OWRC seeks final approval of OMB.

19. Approval of CMHC granted.

20. Contracts entered into and work commences.

* Asterisk(*) indicates steps required directly by the municipality.

NOTE: In the majority of cases, the dealings with Central Mortgage and Housing Corporation will be handled by the consulting engineer acting for the municipality.

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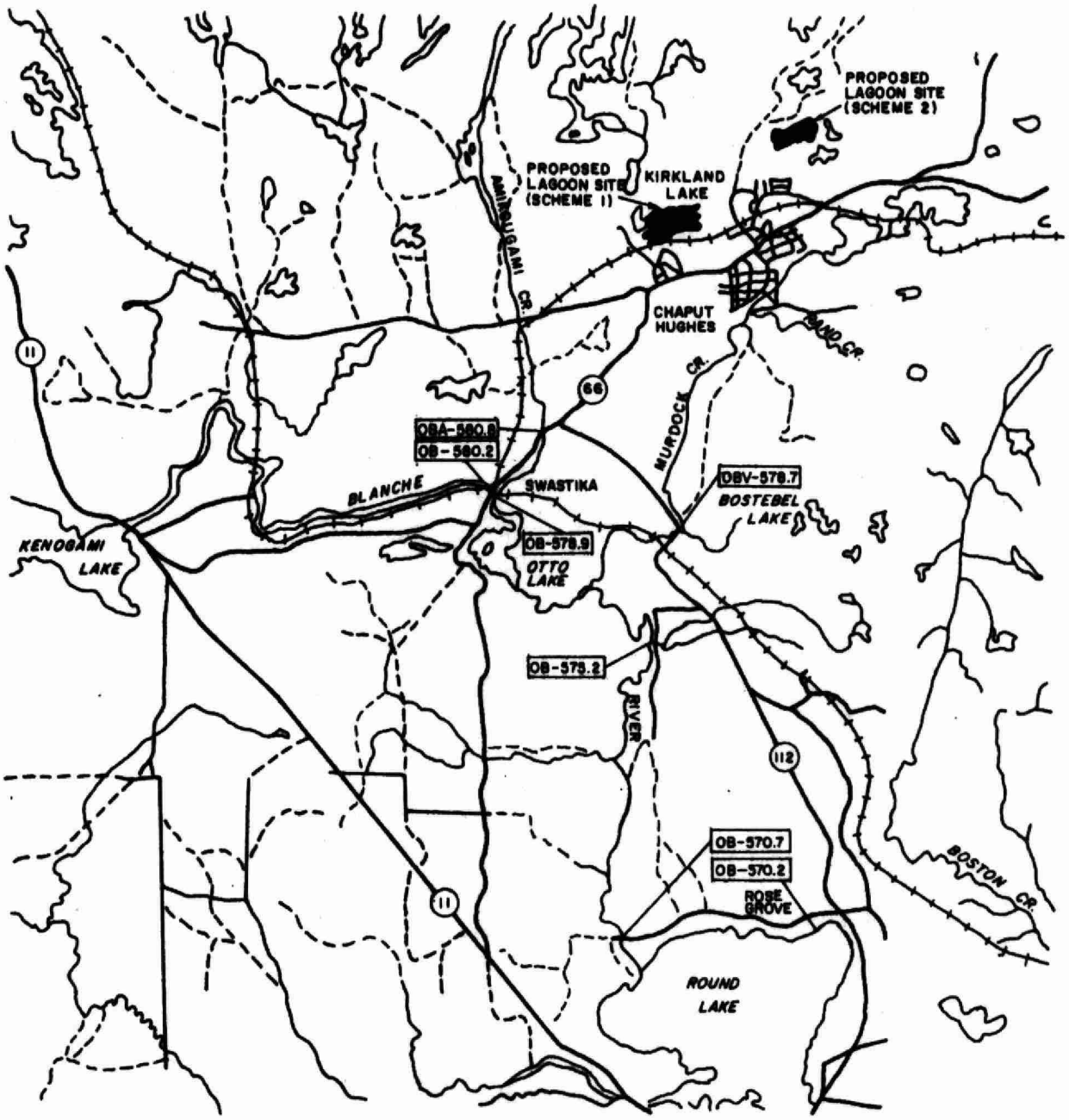
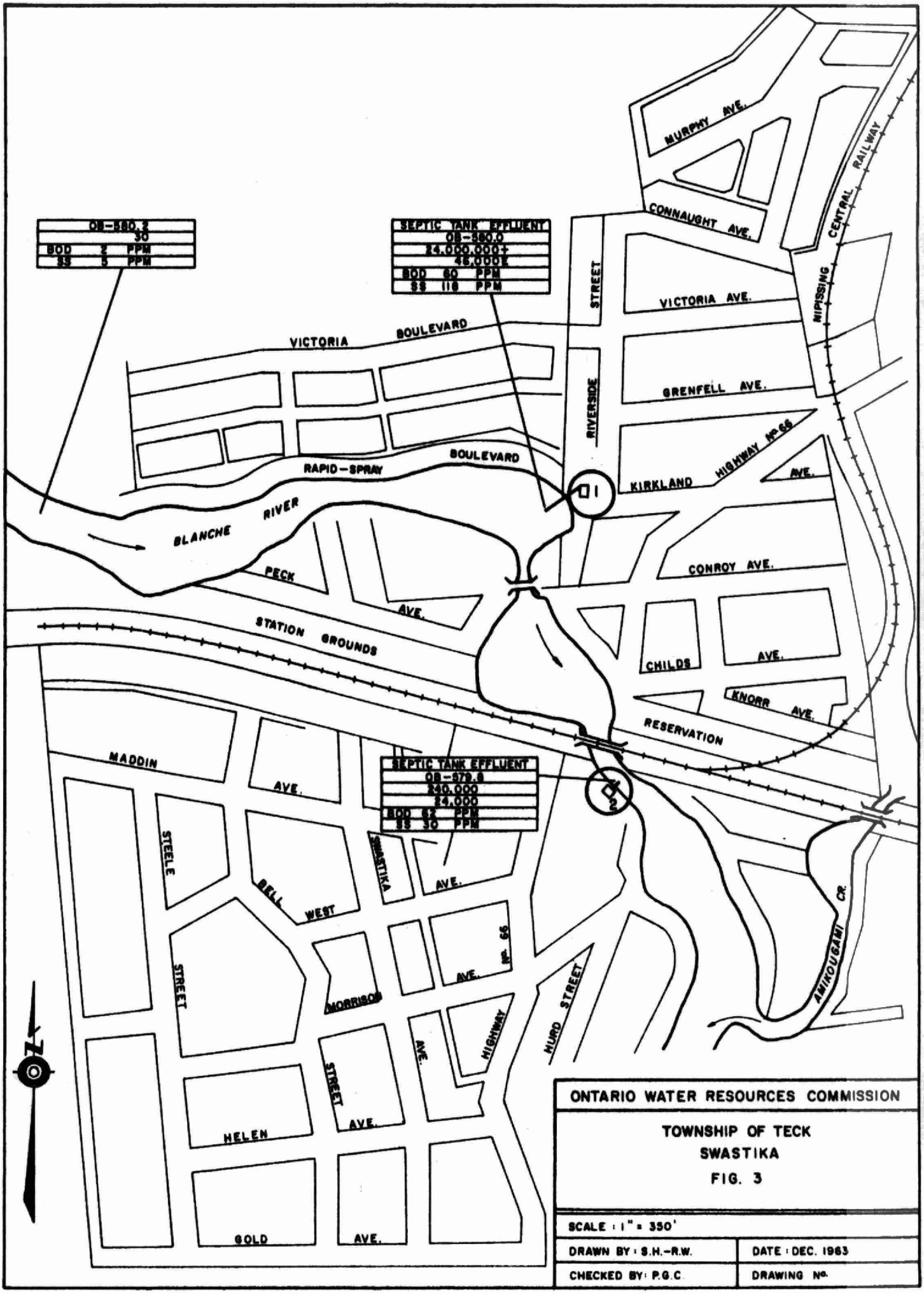


LEGEND

OB-575.2 SAMPLING POINT SHOWING STREAM AND MILEAGE

ONTARIO WATER RESOURCES COMMISSION	
BLANCHE RIVER WATERSHED KIRKLAND LAKE AND SWASTIKA TO ROUND LAKE FIG. 2	
SCALE : 1" = 2 MI.	
DRAWN BY : S.H.-R.W.	DATE : DEC. 1963
CHECKED BY: P.G.C.	DRAWING No.


OB-580.2
30
BOD 2 PPM
SS 5 PPM
SEPTIC TANK EFFLUENT
OB-580.0
24,000,000+
46,000E
BOD 60 PPM
SS 118 PPM
SEPTIC TANK EFFLUENT
OB-579.8
240,000
24,000
BOD 62 PPM
SS 30 PPM
MURPHY AVE.
CONNAUGHT AVE.
CENTRAL RAILWAY
NIPISSING
STREET
VICTORIA AVE.
VICTORIA BOULEVARD
RIVERSIDE
GRENFELL AVE.
RAPID-SPRAY BOULEVARD
KIRKLAND AVE.
HIGHWAY No. 66
BLANCHE RIVER
PECK AVE.
CONROY AVE.
STATION GROUNDS
CHILDS AVE.
KNORR AVE.
RESERVATION
MADDIN AVE.
STEELE STREET
BELL WEST
SWASTIKA AVE.
MORRISON AVE.
HIGHWAY No. 66
HURD STREET
AMIKOUGAMI CR.
HELEN STREET
GOLD AVE.
ONTARIO WATER RESOURCES COMMISSION
TOWNSHIP OF TECK
SWASTIKA
FIG. 3
SCALE : 1" = 350'
DRAWN BY : S.H.-R.W.
DATE : DEC. 1963
CHECKED BY: P.G.C.
DRAWING No.